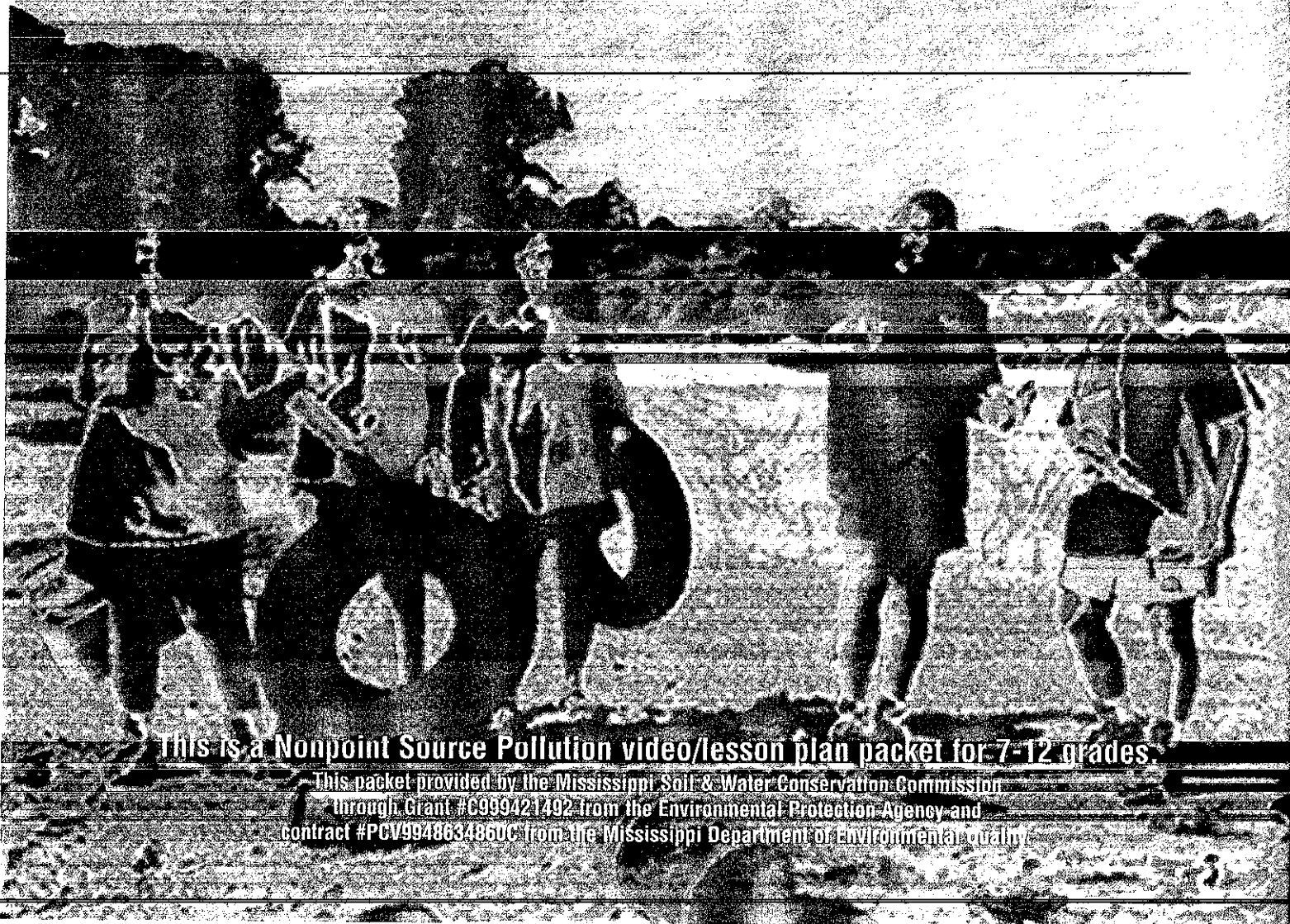


THE UNCLEAR FUTURE OF CLEAR CREEK



This is a Nonpoint Source Pollution video/lesson plan packet for 7-12 grades.

This packet provided by the Mississippi Soil & Water Conservation Commission
through Grant #C999421492 from the Environmental Protection Agency and
contract #PCV9948634860C from the Mississippi Department of Environmental Quality.

ACKNOWLEDGMENTS

TEACHERS

Joe Ann Clark
Beth Guider
June Hollis
Cherie Humphrey
Gloria Lewis

EDITORS

Sam Allen
Matt Knight

RESOURCE PEOPLE

Dale Bullock, District Conservationist
USDA, Natural Resources Conservation Service

Roy King, Soil Conservation Technician
Hinds County SWCD

David Dockery, Office of Geology
Department of Environmental Quality

Charles Cockrell, Office of Pollution Control
Department of Environmental Quality

Ann Marie Moorman, Office of Pollution Control
Department of Environmental Quality

Laura Beiser, Office of Pollution Control
Department of Environmental Quality

Robert Wimbish, Area Soil Scientist
USDA, Natural Resources Conservation Service

Larry Golden, Conservation Agronomist
USDA, Natural Resources Conservation Service

Dr. Michael Newman
Agri-Education & Experimental Statistics

Thanks to all those who helped make this Nonpoint Source Pollution packet possible.

Table of Contents

Soil Related Lessons

Where Does the Water Go?
Four P's Not in a Pod
Your Soil May Be Dirty
The Settling of Eroded Rock Particles
NPS's and BMP's (The ABC's of Pollution)
What Would You Do About...Erosion and Runoff?

Water Related Lessons

Homemade Sampling
Rain Game
Clean Up That Water
Water, Water Everywhere
I'm Not the Problem! We Are!
The Peppermint Pollution
Oil and Water Don't Mix

Enrichment Lessons/Activities

Follow the Leader
Conservation Fair
Where the Wild Things Grow
Trip Around the World
What Would You Do About...Nonpoint Source Pollution?
Hazardous Household Products

Glossary

Resources

This publication results from work sponsored by an agency of the State of Mississippi through a grant from the United States Government. Neither the State of Mississippi, nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, constitute or imply its endorsement, recommendation, or favoring by the State of Mississippi or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the State of Mississippi or any agency thereof.

Where Does The Water Go?

Problem Area: Nonpoint Source Pollution

Subject Area: Science, Agri-science, and Social Studies

Activity Time: 45 minutes

Grade Level: 7 - 12

Objectives: 1. At the end of this lesson, the students should be able to determine the difference in the amount of water absorbed by sand, silt and clay.

Teacher Background:

Sand, silt and clay are all components of Mississippi soil, but their properties are different in many ways. This activity illustrates a basic difference--their ability to hold water.

Materials Needed:

1. 6 paper drinking cups
2. Straight pin or paper clips
3. Water
4. Ruler (cm.)
5. Graduated cylinder
6. Samples of sand, silt and clay

Vocabulary:

- | | |
|----------------|-------------|
| 1. Percolation | 4. Clay |
| 2. Sand | 5. Loam |
| 3. Silt | 6. Leaching |

Description of Activity:

1. Puncture the bottom of a paper cup with the straight pin or paper clip (20 holes).
2. Place 2 inches of sand in the cup.
3. Repeat steps 1 and 2 with the silt and clay.
4. Pour 50 ml of water into each of the three cups (have a student hold a cup over a new cup).
5. After 2 minutes measure the volume of water that percolated through each sample.
6. Record and compare data.

7. Discuss the importance of each finding.

Variation or Extended Activities:

1. Relate the absorbency of the soils to the size of the soil particles.
2. Explain why some landfills are lined with clay.
3. Explain why some areas with sandy soil are more susceptible to ground water pollution.
4. Do a hands-on activity by using milk cartons for a house and septic tank with bendable straws for the pipes and field line. Show how tank is designed. Have a building contractor explain how soil types are important in building foundations.
5. Have a health department sanitarian describe and show how percolation tests are run and explain details of building septic tank field lines.
6. Have a geologist, an environmental scientist, a soil scientist, or a sanitarian, describe groundwater aquifers and their susceptibility to becoming polluted or not because of soil types. Have someone demonstrate a groundwater aquifer model.

Evaluation Activities:

1. Make a data table and graph showing the comparisons of the different soil types.

References/Resource Persons:

Mississippi Soil and Water Conservation Commission
USDA, Natural Resource Conservation Service/MS Department of Environmental Quality
Mississippi Cooperative Extension Service
Mississippi Department of Health

Author of Activity: Cherie Humphrey, Joe Ann Clark, Beth Guider

Four P's Not in a Pod

Problem Area: Nonpoint Source Pollution

Subject Area: Geography or Science

Activity Time: 1 hour

Grade Level: 7 - 12

Objectives: 1. To demonstrate porosity, permeability, percolation and pollution

Teacher Background :

This activity is a simple demonstration of the way water moves through various substances. These substances all play their part in filtering out pollutants, but some are more effective filters than others.

Materials Needed:

1. 3 to 5 (2-liter) coke bottles cut in half (you need one for each different type particle you use.)
2. 1/2 cup each of sand, gravel, potting soil, red clay or other clay, etc.
3. 1 3" square of cheesecloth to cover the top of each coke bottle.
(Can use pantyhose instead of cheesecloth)
4. Rubber bands to attach cloth to coke bottle
5. Measuring Cup
6. 1 gallon of water (Amount varies according to how many particles you use.)

Vocabulary:

1. Permeability
2. Porosity
3. Pollution
4. Percolation

Description of Activity:

1. Cut 2 liter coke bottles in two about 1/3 down.
2. Tightly attach a filter (cloth) to the top of the bottle with a rubber band.
3. Turn the bottle top upside down into the bottom part of the bottle.
4. Put sand in one bottle top, gravel in another, clay in another, etc.

5. Pour 1 cup of water on top of the sand, gravel, clay, etc.
6. Let the water drip.
7. Observe the percolation, the porosity and permeability of each type particle.

Variations or Extended Activities

1. Do the demonstration as a race. Have students pour the water onto the particles at the same time and see which particles are the most permeable.
2. Do the same demonstration without the filter. Put in a thin layer of gravel which is large enough to prevent the particles from falling through the hole. Use dirty water and observe the difference in clarity when water is poured through sand, clay, gravel, etc.
3. To use the same demonstration to show pollution, put a drop of food coloring on the top of the particle BEFORE you pour the water on. Watch the pollution as it appears in the water.
4. Do the same demonstration except put the bottle caps on the bottles so that the water cannot pass through. Carefully add the same amount of water to each container. Observe porosity.

Evaluation Activity

1. Make predictions of mixed materials such as sand and gravel.
2. Graph the results.
3. Discuss building landfills on each type material.
4. Discuss building a pond on each type material.

References / Resource Persons

Mississippi Soil and Water Conservation Commission
Mississippi Department of Environmental Quality

Author of Activity: June Hollis

Your Soil May Be Dirty

Problem Area: Nonpoint Source Pollution

Subject Area: Physical Science, Chemistry

Activity Time: 2 hours

Grade Level: 7th grade +

Objectives:

1. Students should be able to determine if pollutants are absorbed into the soil.
2. Students should be able to determine which soil type absorbs more pollutants.

Teacher Background:

Pollution of the soil is a problem in the United States and elsewhere. This activity is designed to show students the way in which soils absorb contaminants.

Materials Needed:

1. 2 quarts of different soil types (sand, silt, clay, etc.)
2. Small gravel
3. 2 liter plastic bottle per soil type
4. Funnel supports
5. Support stands
6. Clean plastic beaker per soil type
7. HCL solution with pH 3
8. Liquid fertilizer
9. Tap water
10. Water high in chlorine
11. pH test (or pH meter)
12. Nitrate test
13. Chlorine test

Vocabulary:

1. Pollutant
2. Soil
3. Potting Soil

Description of Activity:

1. Mix and pretest all solutions, then log the results.
2. Cut off the bottom half of the plastic bottles.
3. Place gravel into bottles to prevent soil from blocking drainage.

4. Put soil into bottles until about 2/3 full (test one soil type completely before beginning the next).
5. Place bottles on funnel support, measure, and pour the same amount of solution into each soil sample. Leave to drain into its beaker.
6. Test drained solution to identify any results and then log your results.
7. Complete for each soil type and log results.
8. Compare results.

Extended Activities:

1. Use the same soil type to test the germination of seeds. Answer which soil germinates seeds the quickest. Refer back to logged results to determine how this information applies to the germination of seeds.

Evaluation Activities:

1. Are pollutants absorbed into the soil?
2. Which type of soil absorbs the most pollutants?
3. Which type of soil absorbs the least amount of pollutants?
4. How do you determine if soil has absorbed pollutants?
5. How do you test for pH?
6. Where do nitrates in the water come from?
7. What is the procedure for testing nitrates?
8. What is the pH of drinking water?
9. Where does chlorine come from in polluted water?

Reference / Resource Persons:

Mississippi Soil and Water Conservation Commission

Author of Activity: Gloria Lewis

The Settling of Eroded Rock Particles

Problem Area: Nonpoint Source Pollution

Subject Area: Earth Science

Activity Time: 2 hours

Grade Level: Junior High

Objectives: 1. Students should compare the way eroded rock particles of different kinds are deposited by water.

Teacher Background:

Sedimentation is an important phenomenon in the environment, but it often occurs in a way that is difficult to observe. Physical geography is constantly being changed by sedimentation (ex: Delta of Mississippi River area). In this activity students can observe sedimentation close-up.

Materials Needed:

1. Sand
2. Large and small pebbles
3. Water
4. Large clean container with lid

Vocabulary:

1. Deposition
2. Sediments
3. Erosion
4. Riffle

Description of Activity:

1. Mix together sand, large and small pebbles using level amounts of each. Place some of this mixture in a jar and add water until it is about 3/4 full.

2. Carefully shake the container.
3. Place the container on a table and allow the contents to settle.
4. Observe and record the order and/or how the particles settle.
5. Explain where the particles could have come from in nature.
How could this affect nonpoint source pollution? What role does erosion play? Discuss sediments, riffle, deposition.

Variation or Extended Activities:

1. Before doing the activity have the students predict the outcome and compare it with the actual way it occurred.
2. Build a model to demonstrate how this occurs in a natural stream or river.

Evaluation Activity:

1. Have students draw a diagram of the outcome or have them to explain how materials settle out of running water.

References/Resource Persons:

Mississippi Soil and Water Conservation Commission
USDA Natural Resources Conservation Service
U.S. Army Corps of Engineers

Author of Activity: Cherie Humphrey

NPS's and BMP's (The ABC's of Pollution)

Problem Area: Nonpoint Source Pollution

Subject Area: Environmental Science

Activity Time: 3 days

Grade Level: 7 - 12

Objectives:

1. The students will identify land uses that cause Nonpoint Source Pollution (NPS) of our water supply.
2. The students will identify Best Management Practices (BMPs) to reduce NPS Pollution.

Teacher Background :

This project gives an overview of the causes and treatments for Nonpoint Source Pollution. Students can go with their individual interests as they learn about ways to reduce NPSs.

Materials Needed:

1. Poster Board
2. Markers
3. Materials from the Department of Environmental Quality

Vocabulary:

1. NPS
2. BMPs
3. Silviculture

Description of Activity:

1. Let the students research Nonpoint Source Pollution to discover which land uses pollute the water supply. Examples:
 - A. Agriculture - erosion, chemicals, fertilizer, animal wastes
 - B. Construction - sediment from land clearing and grading
 - C. Forestry - sediment, woody debris and chemicals from silviculture and timber activities
 - D. Land Disposal - septic tank disposal systems
 - E. Surface Mining - sediment-laden run off from mining sand, gravel, dirt or minerals

- F. Urban Storm Water Runoff - automobile waste substances such as oil, gas, antifreeze, and other pollutants carried from streets, parking lots, etc.
- G. Hydrologic Modifications - erosion and sediment due to alteration of stream channels

2. Have the students brainstorm possible Best Management Practices for each of the land uses that causes pollution. It might be necessary for them to research BMPs. (Ex.)
 - A. Tree Buffer Zone
 - B. Grass Filter Strips
 - C. Conservation Tillage
 - D. Silt Fence
 - E. Hay Bale Dikes
3. Using the collected materials, the students should make charts to present their information.
4. The charts are to be presented to the class along with a written or oral presentation.

Variations or Extended Activities:

1. The students can find examples of poor land uses in their own community, collect information, plot a map, come up with a plan of action and present the material to the local authorities.

Evaluation Activity:

1. Accuracy of the information on the chart.

References / Resources:

Mississippi Department of Environmental Quality
Mississippi Soil and Water Conservation Commission

Author of Activity: Joe Ann Clark

What Would YOU Do About...Erosion and Runoff?

Problem Area: Nonpoint Source Pollution

Subject Area: Chemistry, Geography, Agri-science

Activity Time: 4 days +

Grade Level: 7 - 12

Objectives:

1. Students should be able to determine erosion and deposition of farmland.
2. Student should be able to determine pH and nitrate level in runoff water.

Teacher Background:

Erosion and runoff play an extremely important part in agriculture and in society in general. Both have a great impact on farming all over the world, leading to financial losses, environmental damage, and inadequate food production. This activity demonstrates erosion and runoff under various agricultural conditions.

Materials Needed:

1. 4 aluminum pans (9" x 13" x 2")
2. Backyard dirt 1" - 1 1/2" deep in each pan
3. Seeds that will germinate quickly (ex: Wisconsin Fast Grow Plants)
4. Tap water
5. Liquid fertilizer (ex: Miracle Grow)
6. pH test kit or a pH meter
7. Nitrate test kit
8. Rubber tubing
9. 4 buckets and a watering can

Vocabulary:

1. Deposition
2. Erosion
3. pH
4. Nitrate
5. Nonpoint Source Pollution

Description of Activity:

1. Mix liquid fertilizer in a container, test the pH and nitrate content. Log findings. Test tap water for pH and nitrate level. Log findings.
2. Place soil equally in each pan.
3. Plant seeds in pans 1 and 2, then place in a

sunny area to begin germination. After they have germinated, plant pans 3 and 4 with seeds.

4. Use an inclined plane and a block to slant each pan for runoff, attach one end of a piece of rubber tubing to the end of each pan for drainage. Put the other end into a bucket.
5. Using the watering can, water crops 1 and 3 with regular tap water, water crops 2 and 4 with liquid fertilizer.
6. After each runoff has been collected, test for pH and nitrate content, and calculate soil loss from water content. Log findings and compare.
7. Repeat steps 5 and 6 every other day. Log results.

Variation or Extended Activities:

1. Germinate seeds by the no till, mulch till, or conventional till method to see which will reduce erosion when pans have been inclined.

Evaluation Activities:

1. Which pans lost the most soil? Why?
2. Did the pH of any of the test change?
3. Did the nitrate level of the runoff water change from the pre-test? Which changed the most?
4. What could be done to eliminate the problem of erosion in this experiment?
5. How did letting the plants begin germination help?
6. How is the inclined plane associated in a natural environment?

References/Resource Persons:

USDA, Natural Resource Conservation Service

Author of Activity: Gloria W. Lewis

Homemade Sampling

Problem Area: Nonpoint Source Pollution

Subject Area: Chemistry and Biology

Activity Time: 2 hours +

Grade Level: 7 - 12

Objectives: 1. Students should be able to determine if nonpoint source pollution has occurred by testing/identifying chemically and biologically.

Teacher Background:

This activity provides an up-close inspection for Nonpoint Source Pollution. The students are exposed to the "nuts and bolts" of how to identify nonpoint source pollution.

Materials Needed:

1. Homemade Sampling Equipment

- a. dip net
- b. plastic bottle dredge
- c. deep water sampler
- d. plankton sampler
- e. seine

2. Specimen pans

3. pH test kit

4. Nitrate test kit

5. Chlorine test kit

6. Dissolved oxygen test kit

7. Macro-Invertebrate identification chart

Vocabulary:

1. Macro-Invertebrate
2. Point Source Pollution
3. Nonpoint Source Pollution

Description of Activity:

1. Follow instructions in "Homemade Sampling Equipment" guide to make the variety of tools that will be used.

2. Go on a field trip to a local water area and identify macro-invertebrates using identification charts.

3. Test for pH, nitrate, chlorine, and dissolved oxygen.

4. Log results for future reference.

This activity should be used to make and practice using tools that are needed to collect data/specimens to prove or disprove point and nonpoint pollution.*

Variation or Extended Activities:

1. Go on another field trip to the same place later on in the year to determine any changes.

Evaluation Activity:

1. What is a micro-invertebrate?
2. What tools did you use on the field trip? Was this tool helpful in catching macro-invertebrates?
3. What invertebrates could you identify? How many of each?
4. What was the pH of the water?
5. How did you test for nitrates?
6. How did you test for chlorine?
7. Where did you find the best water with dissolved oxygen?
8. What quality was this water?

References/Resource Persons:

Mississippi Department of Environmental Quality
Homemade Sampling Equipment

Water Quality Series Booklet

Insect and Stream Quality, and Stream Insects and Crustaceans
The Izaak Walton League of America, INC.

Author of Activity: Gloria W. Lewis

Rain Game

Problem Area: Nonpoint Source Pollution

Subject Area: Ecology

Activity Time: 1 hour

Grade Level: Elementary - High School

Objectives: 1. Students should be able to list at least 3 sources of nonpoint source pollution.

Teacher Background :

This activity shows how pollutants can contaminate stream water. When such pollution occurs, animals and plants suffer and the whole ecosystem can be affected.

Materials Needed

1. 2" squares of colored construction paper
2. Large room or playing area

Vocabulary

1. Nonpoint Source Pollution (NPS)
2. Point Source Pollution
3. Runoff
4. Toxicity

Description of Activity

1. Students line up on one side of room or playing area.
2. They are "rain". Colored slips of paper are laid out on floor or playing area.
3. Each color represents a source of Nonpoint Source Pollution. Example:
 - * Green - gasoline spilled on parking lot
 - * Red - pesticide from a spill
 - * White - sediment from construction area
 - * Orange - fertilizer run-off from cropland
 - * Yellow - animal waste run-off from dairy operation, etc.
4. Students are given 30 seconds (+ or -) to make it to the other side, picking up squares as they go.

5. Upon reaching the other side, students are told they represent a stream.
6. At this point students are told or given a chart of what the colors represent.
7. Students can determine what type of pollution their "stream" has and a discussion can follow on stream pollution - causes and prevention.
8. Students may explore ways to prevent the main source of pollution in their "stream".
 - * Students may discuss where all the streams collect and what this large group of streams form.
 - * Map streams in their school or home area.

Variations of Extended Activities

1. To make more complicated - quantities of pollution could be added to paper slips. Students could then add up total amounts of pollution; compare to standards and see if their stream contains "lethal" levels of toxins. Also could make charts, compare percentages, etc.
2. Persons or animals harmed by the pollution source.

Evaluation Activity

1. Graph, comparing pollution sources.
2. Chart with suggested solutions.

References / Resource Persons

Mississippi Department of Environmental Quality
Mississippi Soil and Water Conservation Commission
Bureau of Marine Resources
(Pamphlet) Nonpoint Source Pollution

Mississippi Department of Environmental Quality - Office of Pollution Control

Author of Activity: Beth Guider

Clean Up That Water

Problem Area: Nonpoint Source Pollution

Subject Area: Geography and Science

Activity Time: 1 hour

Grade Level: 7-12

Objectives: Students should be able to list the steps in the water treatment process.

Teacher Background :

This activity shows how water is cleaned up so that we can use it as drinking water.

Materials Needed:

1. Paper cups
2. 1 cup of water
3. 2 clear containers (jars, cups, glasses, etc.)
4. 1 tsp. Alum
5. 1/4 cup soil
6. 1/2 cup sand
7. 1/2 cup gravel
8. Food coloring (optional)

Vocabulary:

- | | |
|------------------|-----------------|
| 1. Potable | 5. Floc |
| 2. Aeration | 6. Filtration |
| 3. Coagulation | 7. Chlorination |
| 4. Sedimentation | |

Description of Activity:

1. Discuss sources of drinking water and the water purification process required to make it possible.
2. Demonstration water purification process:
 - A. Put 1/4 cup of soil into a jar of water.
 - B. Aerate the water by pouring it back and forth from one cup to another several times.
 - C. Add 1 tsp. alum to the water. Observe the "floc." Allow water to sit as you discuss why particles sink faster after

alum is added. (Particles attach themselves to the alum which makes them heavier.)

- D. Put 1/2 cup gravel into a paper cup which has 5 - 10 small holes in the bottom. (Use a toothpick to do this.) Pour the "cleaned" water over the gravel, and allow the water to drip into a clear container. Observe the clarity.

- E. Repeat the process using the 1/2 cup of sand.

- F. To simulate the chlorination, add a drop of blue food coloring.

- G. Discuss the process.

Variation or Extended Activities:

1. Step F could also represent the addition of pollution (you might add red coloring to represent the pollution). Then you could repeat steps D and E to see if the pollution is removed by filtration. Discuss the result.
2. Use charcoal to filter the water. Note any differences.
3. Visit a water treatment plant.
4. Invite someone from a water treatment plant to speak to your class.

Evaluation Activity:

1. Have students write a description of the process.
2. Measure water carefully before, during and after the demonstration.
3. Graph the results.

References / Resources Persons:

Mississippi Department of Environmental Quality-Ground water aquifer model for demonstration
Mississippi Soil and Water Conservation Commission

Author of Activity: June Hollis

Water, Water Everywhere

Problem Area: Nonpoint Source Pollution

Subject Area: Environmental Science

Activity Time: Semester Project

Grade Level: 7-12

Objectives:

1. Students will map the watershed of their school campus from the school yard, to the stream, to the river, etc.
2. Students will monitor the stream/creek nearest to the school.

Teacher Background :

This project offers a practical way for students to learn about watersheds. In addition, they will observe the various organisms that inhabit a lake or stream. Understanding more about water, its movement, and its inhabitants, can help students appreciate the role water plays in our life and environment.

Material Needed:

1. Macro-Invertebrates Identification Chart
2. County Maps
3. Seine
4. Tweezers
5. Flat plastic pans
6. Magnifying glasses

Vocabulary:

1. Macro-Invertebrate
2. Watershed
3. Best Management Practices (BMPs)
4. Nonpoint Source Pollution (NPS)
5. Point Source Pollution

Description of Activity:

1. Obtain maps of the school area from the Extension Service and the U. S. Geological Survey to help determine the flow pattern, the area streams, land uses, pollution sources and topography of the land. It may be possible to have a guest resource person to help read the map and teach the class. The local Soil and Water Conservation District or the U.S. Department of Agriculture Natural Resources Conservation Service.

2. Using the Macro-Invertebrate Identification Chart and the equipment, test the stream for water quality by identifying the different insects found in the stream.
3. Establish monitoring stations in the stream.
4. Identify potential pollution problems and their sources: Nonpoint Source Pollution or Point Source Pollution.
5. Study different types of Best Management Practices (BMPs) and devise a master plan for keeping the stream pollution free.
6. Share the plan with local authorities and help work toward solutions.
7. Map your watershed to determine possible sources of pollution, its size, and the location of different land uses and Point and Nonpoint Source Pollution.

Variation or Extended Activities:

1. Students may work individually or in small groups. This activity can be used with the "Where the Wild Life Grows" activity. It may also be used to clean up local streams and be included in a community clean-up campaign.

Evaluation Activity

1. Correct identification of potential pollution problems and their sources and solutions; accurately drawn maps of the watershed

References / Resource People

Mississippi Department of Environmental Quality / Mississippi Cooperative Extension Service
U.S. Geological Survey, local officials

In Mississippi, to order maps contact:
Mississippi Department of Environmental Quality
Office of Geology
Map Sales

Street Address:
Southport Center
2380 Highway 80 West
Jackson, Mississippi

Mailing Address:
Office of Geology
P.O. Box 20307
Jackson, MS 39289-1307

Telephone:
Receptionist, 601-961-5500
Publication Sales, 601-961-5523

"Nonpoint Source Pollution - Problems and Solutions" (Pamphlet). Depart. of Environmental Quality
Office of Pollution Control

Author of Activity: Joe Ann Clark

I'm Not the Problem! We Are!

Problem Area: Nonpoint Source Pollution

Subject Area: Geography or Science

Activity Title: 1 hour

Grade Level: 7 - 12

Objectives: 1. Students should be able to tell that we all contribute to pollution.

Teacher Background:

Nonpoint Source Pollution can accumulate until it is a big problem. NPS Pollution can be difficult or impossible to trace back to its source. What can we do about NPS Pollution? As individuals, we can try not to pollute the environment with litter and other forms of pollution. As a society, we can pass or enforce laws to keep the environment clean. We can also encourage others to be responsible in how they treat the environment.

Materials Needed:

1. Dropper
2. Jar of clear water
3. Food coloring or other colored water such as coffee

Vocabulary:

1. Nonpoint Source Pollution
2. Pollutant

Description of Activities:

1. Discuss the part we each play in polluting our environment (littering, NPS Pollution, etc.).
2. Have first student drop one drop of food coloring into a jar of clear water and note the results.

3. Go around the room until all students have added one drop of "pollution" to the water. Note the results as the water changes color.
4. Discuss the results and compare this to litter or NPS Pollution.

Variations or Extended Activities:

1. Add one drop of chlorine at a time to see how many drops of chlorine are needed to make the water clear again. Discuss the reasons chlorine is added to our water. Be sure students understand that the chlorine does NOT remove the pollution, it only makes water clear.
2. Have students talk to their family members about the importance of each individual not polluting. Report their reactions back to the class.

Evaluation Activity:

1. Graph the experiment results.
2. Write about their observations.
3. Make a poster about NPS Pollution.

References/Resource Persons:

Mississippi Soil and Water Conservation Commission
Mississippi Department of Environmental Quality

Author of Activity: June Hollis

The Peppermint Pollution

Problem Area: Nonpoint Source Pollution

Subject Area: Geography or Science

Activity Time: 45 minutes

Grade Level: 7 - 12

Objectives: 1. To demonstrate the results of pollution carried into a lake or river runoff.

Teacher Background

Pollution crops up in ways we do not expect. We must work hard to make sure that we are not polluting our environment. This is difficult, since it is hard to live without disturbing and polluting the environment some (Ex: exhaust from car, garbage). But we should always try to be responsible about the environment. After all, it's our home.

Materials Needed:

1. 10 ft. of blue yarn (any color or length will do)
2. Peppermints used as "pollutants" (Non-food items can be used: paper clips, pieces of paper, etc.)
3. A tape of rain sounds and a tape player (optional)

Vocabulary:

1. Pollution
2. Pollutants

Description of Activity:

1. Before the class arrives, using the yarn, outline your lake on the floor. Tape it down in several places.

2. After discussing NPS Pollution, make a list of possible pollutants on the board.
3. As it rains (play rain sounds if you have any to add to the atmosphere), students can eat their treat and throw the wrapper into the "lake.."
4. Discuss observations.

Variations or Extended Activities:

1. Make population distribution part of the lesson.
2. Let only 2 or 3 students "live around" the lake to cause NPS Pollution.
3. Discuss things that would prevent pollution from reaching the lake. (Forests, lack of development, few roads, etc.)
4. Then cut down the forests and develop a resort area or city.
5. Allow all students to pollute the lake.
6. Observe and discuss the differences.

Evaluation Activity:

1. Write observations.
2. Draw a picture of a lake and its watershed, including at least 4 scenes that might pollute the lake because of runoff. This is fun to do in groups.

References/Resource Persons:

Mississippi Soil and Water Conservation Commission
Mississippi Department of Environmental Quality

Author of Activity: June Hollis

Oil and Water DON'T Mix

Problem Area: Nonpoint Source Pollution "Oil Recycling"

Subject Area: Earth Science

Activity Time: 1 hour

Grade Level: 7 - 12

Objectives: 1. Students should be able to tell what oil will do to the environment and determine the easiest way to recycle oil in the community.

Teacher Background :

Oil is a common product that people use every day. Oil is made from different substances. Motor oil, for example, is made from petroleum-a liquid found beneath the earth's surface. Although it is very useful to our society, oil can cause problems for the environment and our society when not disposed of properly.

Materials Needed:

1. Copy of "Oil and Water Don't Mix" fun quiz

Vocabulary:

1. Oil
2. Motor Oil
3. Refine
4. Recycle
5. Environment

Description of Activity:

1. Teachers should supply each student with a copy of the "fun quiz" about oil. (see attached sheet)
2. Students should take the quiz.
3. The teacher could discuss the correct answers with the students.

Variations or Extended Activities:

1. Students could search their communities for industries, service stations, etc., which recycle oil.
2. Students could then mount a publicity campaign in their communities to recycle oil.
3. Students could research products made from recycled oil.

Evaluation Activity:

1. Give fun sheet as a Pre & Post Quiz.

References / Resource Persons:

Community resources including large discount/department stores and service stations.

Local Newspaper

Radio Stations

Author of Activity: Beth Guider

The "Oil and Water DON'T Mix" Fun Quiz

Answer *True (T)* or *False (F)* for the following statements:

- ☐ 1. Only 3% of the earth's water is fresh water.
- ☐ 2. 1 cup of oil will pollute 40,000 gallons of water (a typical pool) so that you could smell and taste the oil.
- ☐ 3. Oil contaminates 150 trillion gallons of freshwater per year.
- ☐ 4. 40% of the pollution in America's waterways is from USED motor oil
- ☐ 5. The Exxon Valdez accident released 11 million gallons of oil.
- ☐ 6. The public improperly disposes of 240 million gallons of oil per year by pouring it down sewers, pouring it on weeds and using it to kill pests.
- ☐ 7. You should never dispose of used oil by burning it.
- ☐ 8. Recycling used oil would save the U.S. 1.3 million barrels of oil per day.
- ☐ 9. Re-refining motor oil takes only 1/3 the energy of refining crude oil to lubricant quality.
- ☐ 10. Some quick-lube and service stations as well as all Wal-Marts and Exxon stations will take used motor oil for recycling.

All answers are true

Follow the Leader

Problem Area: Nonpoint Source Solution

Subject Area: Leadership Skills, Environmental Science

Activity Time: 1 week +

Grade Level: 7 - 12

- Objectives:**
1. The students will enhance their leadership skills through planning and implementation of a service-oriented project for their school and/or community.
 2. The students will research possible environmentally safe practices for their school and/or community.

Teacher Background :

Protecting the environment presents an opportunity for leadership and service. This activity encourages students to become involved in the community and to learn through first-hand experience.

Materials Needed:

1. Pencil
2. Paper
3. Research materials

Vocabulary:

1. Monitoring

Description of Activity :

1. Let the students use their decision making skills to select an environmental topic for their leadership project.
2. The students should use their planning skills to map out an outline of their project.
3. The students will then need to implement their plans into a finished product.

Possible Project Topics are:

1. Meet with the mayor to discuss the city's present and future policies and practices

concerning the environment. Tape the interview and present the information to the class, using a visual aid.

2. Develop a recycling plan for the school and/or community.
3. Develop a clean-up campaign for your school and/or community.
4. Write and distribute a brochure on the safe disposal of oil.
5. Compare and distribute a how-to booklet on backyard composting.

Variations or Extended Activities:

1. Students can work with local school and community leaders to develop their projects.
2. The students may work individually or in groups.
3. Students should be encouraged to be creative in the approach to and the presentation of their projects.
4. Students may select their own projects

Evaluation Activity:

1. Effectiveness of project
2. Response of community and/or school to projects

References / Resource Persons:

Local school and/or community leaders

People and/or materials from local and state agencies such as the Extension Service, EPA, USDA, DEQ, and the Mississippi Soil and Water Conservation Commission

Author: Joe Ann Clark

Conservation Fair

Problem Area: Nonpoint Source Pollution

Subject Area: Environmental Science

Activity Time: 1 Hour

Grade Level: 7 - 12

Objectives:

1. The students will research a variety of conservation practices.
2. The students will plan and implement a "Conservation Fair" for elementary school children.

Teacher Background :

Learning about conservation at an early age is important. In this activity, students are exposed to a variety of conservation-related topics, some of which may spark their interest. This activity benefits more than one group. First, it benefits the students involved by allowing them to become the "teachers" about conservation. Second, it benefits the younger youth by providing them with conservation information in an interesting format from older peers whom they admire.

Materials Needed:

1. Research Materials
2. Poster boards
3. Markers
4. Paint
5. Paint Brushes
6. Cardboard
7. Tables

Vocabulary:

1. Conservation
2. Pollution
3. Conservation Practices

Description of Activity

1. Students should research a wide variety of conservation practices.
2. The students will then brainstorm ideas for the conservation fair.
3. The students will then plan a fair in which they teach good conservation practices to the elementary students.
4. They will select a site and prepare booths, complete with posters, charts and other visual aids to present and teach their information.
5. The students may work in groups to prepare for the "Conservation Fair".

Variations or Extended Activities:

1. The "Conservation Fair" could be presented at a PTA meeting.
2. The fair might be set up at the local mall so that more people would be able to attend.
3. A video of the fair could be made so that other interested people could be made aware of it.

Evaluation Activity:

1. The success of the fair would be determined by the public's response to it; therefore, an evaluation form might be used for those who come to the fair.

References/Resource Persons:

Local environmental agencies for their materials and expertise.

Author of Activity: Joe Ann Clark

Where The Wild Things Grow

Problem Area: Nonpoint Source Pollution

Subject Area: Environmental Science

Activity Time: 2 - 6 weeks

Grade Level: 7 - 12

- Objectives:**
1. Students should be able to list the components that comprise a wildlife habitat.
 2. Students will build an on-campus wildlife habitat.

Teacher Background:

Having a natural wildlife habitat to visit is an excellent way to learn about nature first-hand. Plus it can be a way of getting the community involved.

Materials Needed:

1. Plants
2. Trees
3. Mulch
4. Fertilizer
5. Gravel
6. Planting tools

Vocabulary:

1. Habitat
2. Niche
3. Vegetation

Description of Activity:

1. Seek donated materials from the school and local businesses.
2. Teach the students the components of a habitat. (space, shelter, food, and water).

3. Let the students select an on-campus site for their habitat.
4. The students will plan the layout of the area and draw the plans to scale.
5. Students then should contact resource people for advice on planting the area.
6. Students will then be responsible for the care and maintenance of the habitat.

Variation or Extended Activities:

1. Encourage different classes or businesses to adopt the different areas within the habitat. They would be responsible for the planting, care and follow-up of their area.
2. Make a video tape of the project to show to local leaders to encourage interest in the habitat project.

Evaluation Activity:

1. Observe and record animals that use the habitat.

References/Resource Persons:

- "Buffer Strips for Efficient Conservation" (pamphlet), Natural Resources Conservation Service
Vegetative Filter Strips. (pamphlet July 1988), Environmental Protection Agency
"Gobbler" sawtooth oak. (pamphlet August 1988), Natural Resources Conservation Service
Program Aid Number 1407
Mississippi Soil and Water Conservation Commission
Local landscape or nursery personnel
Mississippi Cooperative Extension Service

Author of Activity: Joe Ann Clark

Trip Around The World

Problem Area: Nonpoint Source Pollution

Subject Area: Earth Science and Geography

Activity Time: 2 - 6 weeks

Grade Level: 7 - 12

Objectives: 1. Students will predict how pollution around the world can affect us in Mississippi.

Teacher Background:

A knowledge of the outside world is important in broadening a student's concept and appreciation of life. Many students will have a deficit in their knowledge of geography; this activity will help them become more familiar with our planet. Plus, it will help them understand the serious problems that pollution creates in some parts of the world.

Materials Needed:

1. Research Books
2. Magazines with pictures of various places around the world (National Geographic)
3. Products grown in area and exported
4. Encyclopedias

Vocabulary:

1. Currents
2. Jet Stream
3. Air Pollution

Description of Activity:

1. Each student or group of students will select a specific location of the earth. (Teacher may assist)
2. The student or groups will then research important facts about the place, such as: how it

was formed or shaped by geological process and/or by man, important resources, weather (climate, jetstream), exports, etc.

3. The students or groups will then identify any possible causes of pollution (including NPS) that has or could affect the location. (Ex.: surface runoff from nearby fields, oil leaks, septic tanks, etc.)
4. Each student/group will then make a poster and/or write a research paper and present it to the class and include how pollution could affect us.

Variation or Extended Activities:

1. Each student will have a world map and locate each place "visited" on the Trip Around The World.
2. Students could dress in costumes from each country or serve foods from their place "visited".
3. Students could learn about international issues: the way pollution affects people in some places; what could be done about it (Ex: smog in Russia creating breathing problems).

Evaluation Activity:

1. Assess poster/papers and class presentation.

References/Resource Persons

Travel agencies may be able to supply travel brochures.

Tourist offices of different countries will usually send free literature (these can be found in major cities like Washington, DC, Houston, TX, New York, NY)

Author of Activity: Cherie Humphrey

What Would YOU Do About...Nonpoint Source Pollution?

Problem Area: Nonpoint Source Pollution

Subject Area: Science, Social Studies and Language Arts

Activity Time: 2 days

Grade Level: 7 - 12

Objectives: 1. In a debate format, students will explore different solutions to problems of Nonpoint Source Pollution.

Teacher Background:

Having students research, debate and judge an issue on Nonpoint Source Pollution is one of the best ways to get them involved. Ideally, this lesson should demonstrate that, in real life, some issues do not have a simple answer that is agreeable to everyone. Sometimes "solutions" to problems can be hard to find. Still, we can make our goal the search for an appropriate response.

Materials Needed:

1. Have sample problems written down for debate and discussion. (Teachers should have sample problems with suggestions for solutions).

Vocabulary:

1. Sedimentation
2. Erosion
3. Hydrologic cycle
4. Effluent

Description of Activity:

1. Divide students into small groups and assign problems of Nonpoint Source Pollution to each group.

2. Students should decide what role they will play in the problem. (Example: A problem could be that sedimentation from a construction site of a new shopping center is washing into a nearby farm pond and filling it in. One group of students will represent the owners of the shopping center and another group will represent the pond owner.)
3. Each group will have a limited amount of time to discuss the "pro" side of their role with the other group given time to refute their argument.
4. Remaining students not involved in the role playing can act as judges deciding which side gave the better argument based on logic and facts.
5. Give the problem out one week and debate it the next.

Variation or Extended Activities:

1. Follow-up the discussion on solving the problem, compromise, etc.
2. Have original sides reverse roles or sides of the problem.

Evaluation Activities:

1. Have each side turn in fact cards (3 x 5) or a brief written video debate.

References/Resource Persons:

Mississippi Soil and Water Conservation Commission
USDA Natural Resources Conservation Service
Mississippi Cooperative Extension Service
Various Sources such as these (some can be supplied by the teacher)

Author of Activity: Beth Guider

Hazardous Household Products

Problem Area: Nonpoint Source Pollution

Subject Area: Science, Chemistry and Home Economics

Activity Time: 2 Hours

Grade Level: 7 - 12

Objectives: 1. At the end of this lesson, the students should be able to identify safe alternatives to hazardous household products.

Teacher Background:

Chemicals are a part of everyday life, but they must be treated with respect. This activity points out the potential hazards of the household chemicals around us, as well as useful alternatives. Remember the example of "MacGyver," who used resourcefulness and a knowledge of chemistry and physics to get out of some sticky situations.

Materials Needed:

1. Paper (use table if desired)
2. Pencil
3. Hazardous Household Products
4. Handout from MS Cooperative Extension Service (optional)

Vocabulary:

1. Ignitable
2. Corrosive
3. Explosive
4. Reactive
5. Toxic
6. Radioactive
7. Hazardous Household Products

Description of Activity:

1. The teacher will define and give a few examples of some hazardous household products, tell why they are hazardous and what substitutes could be used that are less harmful.

2. The students will list hazardous household products they find in their home.
3. The students will then list the possible harmful ingredients found in each, list the potential hazards and list some alternative that can be used.
4. If there are no alternatives possible, have the students specify that the chemicals should be used only when necessary, according to package directions and to dispose of empty containers properly.

Variation or Extended Activities:

1. Research laws that apply to hazardous chemicals and learn who is in charge of enforcing these laws.
2. Upper level cases may include chemical formulas, equations, etc. Lower level cases may omit the list of possible chemicals.

Evaluation Activities:

1. Check the completed table and then have students actually repeat the activity using chemicals they find at their homes.

References/Resource Persons:

Mississippi Department of Environmental Quality
Mississippi Soil and Water Conservation Commission
USDA, Natural Resources Conservation Service
Mississippi Cooperative Extension Service
Mississippi Department of Health

Author of Activity: Cherie Humphrey

Examples:

1. Use lotions and gels instead of aerosol sprays.
2. Use rechargeable batteries instead of disposable ones.
3. Use 1 part vinegar to 32 parts water to wash floors.
4. Use mixture of salt and lemon juice to clean copper.
5. Use dry cornstarch or baking soda as a rug cleaner.
6. Use non-phosphate detergents.
7. Use cedar chips as an alternative to moth balls.
8. Use 2 tablespoons of vinegar to 1 quart of water as a window cleaner.
9. Use baking soda instead of abrasives that contain chlorine.

Glossary

Aeration - to supply or impregnate with air.

Air Pollution - contamination of air by waste & other harmful substances.

Best Management Practices (BMPs) - conservation and land management practices that can reduce the loss of productive topsoil, control erosion and reduce sediments in runoff water.

Chlorination - to treat or cause to combine with chlorine or a chlorine compound.

Clay - soil composed mainly of fine particles of hydrous aluminum silicates and other minerals.

Coagulation - to gather together or form into a mass or group. The process of being clotted or congealed.

Conservation - planned management of a natural resource to prevent exploitation, destruction, or neglect.

Conservation Practices - procedures that reduce the effects on natural resources destruction.

Corrosive - weakening or destroying by a gradual process.

Currents - the part(s) of a fluid body moving continuously in a certain direction. A tidal or nontidal movement of a lake or ocean.

Deposition - the act of depositing soil or sediments.

Effluent - the outflows, usually offensive, from sewage or industrial plants or septic tanks.

Erosion - the removal or wearing away of soil or rock by water, wind or other forces or processes.

Explosive - undergoing a rapid chemical reaction producing noise, heat or expansion of gases.

Filtration - the process of passing through a substance to trap materials.

Habitat - the place where something is commonly found.

Hazardous Household Products - products that harm the environment.

Ignitable - capable of burning.

Jet Stream - a long narrow meandering current of high-speed winds near the tropopause blowing from a generally westerly direction often exceeding 250 miles mph.

Leach - when materials in the soil (such as nutrients, pesticides, chemicals) are washed into lower layers of soil or are dissolved and carried away by water.

Loam - a soil consisting of a friable mixture of varying proportions of clay, silt and sand.

Motor Oil - a lubricating petroleum product used to smooth friction between engine parts.

Macro-Invertebrate - invertebrates large enough to be seen with the naked eye.

Monitoring - to watch, observe, or check for a special purpose.

Nitrate - a form of nitric acid used in fertilizer.

Nonpoint Source Pollution (NPS) - a type of pollution whose source is not readily identifiable--such as pollution caused by a car exhaust carried off city streets by rainwater.

Niche - a habitat supplying the factors necessary for the existence of an organism or species.

Oil - Petroleum product not soluble by water.

ph - expresses either acidity or alkalinity on a scale of 0 - 14. 7 is neutral, from 6 down is acid, from 8 up is alkaline.

Percolation - to pass through small spaces or a porous substance.

Potable - suitable for drinking.

Permeability - open to passage or penetration, especially by fluids.

Porosity - the ratio of the volume of interstices of a material to the volume of its mass.

Pollution - contamination of air, water or soil by the discharge of wastes or other harmful substances.

Point Source Pollution - a type of pollution that can be tracked down to a specific source such as a factory discharge pipe.

Pollutant - something that contaminates, makes land, water and air dirty and unhealthy.

Potting Soil - a mixture of humus and other additive in which to grow vegetation.

Refine - to reduce to a pure state.

Recycle - to return to a useable state.

Runoff - water that flows off land into streams and other waterways.

Riffle - a shallow extending across a stream bed and causing broken water.

Radioactive - spontaneous emitting alpha or beta rays by the disintegration of the nuclei of atoms.

Reactive - readily responsive to a stimulus.

Sand - soil containing 85% or more of sand and a maximum of 10% clay.

Silt - smaller particles of rock that you cannot see without a microscope (.002 mm to .05 mm). It feels smooth and velvety.

Silviculture - the science of cultivating forest crops.

Sedimentation - soil, sand and materials washed from land into waterways.

Soil - a naturally occurring mixture of minerals, organic matter, water and air which has a definite structure and composition and forms on the surface of the land.

Toxic - harmful, destructive or deadly, poisonous.

Vegetation - plant life or total plant cover.

Watershed - all the land that serves as a drainage for a specific stream or river.

RESOURCES

MS Cooperative Extension Service
Mississippi State University
Mississippi State, MS 39762

MS Department of Environmental Quality
Office of Pollution Control, Water Quality Branch
P.O. Box 10385
Jackson, MS 39289-0385
Tel: 601-961-5171

MS Department of Wildlife, Fisheries and Parks
2906 N. State St.
Jackson, MS 39216

MS Farm Bureau Federation
Box 1972
Jackson, MS 39205

MS Forestry Commission
301 N. Lamar
Suite 300
Jackson, MS 39201
Tel: 601-359-1386

MS Museum of Natural Science
111 N. Jefferson
Jackson, MS 39201
Tel: 601-354-7303

MS Soil and Water Conservation Commission
P.O. Box 23005
Jackson, MS 39225-3005
Tel: 601-354-7645

MS Wildlife Federation
520 N. President
Jackson, MS 39201

National Association of Conservation Districts
P.O. Box 855
League City, TX 77574-0855

National Wildlife Federation
1400 16th St. NW
Washington, D.C. 20037-2286
Tel: 800-432-6564

People Against Litter
808 North President St.
Jackson, MS 39201

"Save Our Stream,"
The Izaak Walton League of America, Inc.
1401 Wilson Blvd. Level B
Arlington, Virginia 22209

USDA, Natural Resources Conservation Service
Suite 1321, Federal Bldg.
100 West Capitol St.
Jackson, MS 39269

U.S. Environmental Protection Agency
Region IV
345 Courtland St. NE
Atlanta, GA
Tel: 404-347-2126

"Water in Your Hands"
Soil & Water Conservation Society, 1990
SWCS
7515 NE Ankeny Road
Ankeny, Iowa 50021-9764
Tel: 800-THE-SOIL

*For further information contact your county
Soil and Water Conservation District Office.*